epiTRENDS

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Introduction of a new influenza strain, April and May 2009

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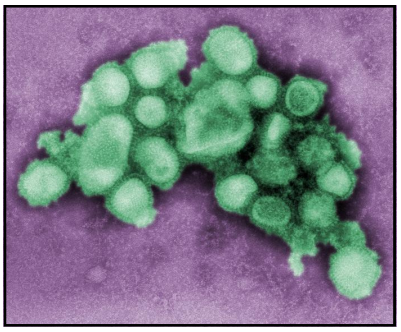
On April 21, 2009, Centers for Disease Control and Prevention (CDC) announced two human cases of influenza caused by a novel swine-origin influenza A virus found during enhanced surveillance activities in California. Subsequently, hundreds of cases were identified in Washington and thousands worldwide. Given the large number of confirmed cases that were almost immediately identified throughout the United States, this virus was likely already widely circulating in late April.



Swine flu virus A/CA/4/09
Electron micrograph, 2009
Photo courtesy of CDC
C.S. Goldsmith and A. Balish

Swine-Origin Influenza Virus (SOIV)

Influenza viruses mutate frequently. Sometimes the mutations are big ("shift") and sometimes they are small ("drift") but they always results in at least slightly different viruses circulating each year. These mutations are the cause of seasonal outbreaks and periodic pandemics among humans. To further complicate this picture, influenza viruses move freely between species and new genetic combinations can evolve.

SOIV has a complex genetic heritage. The genes of this virus appear to be a *reassortment* or mix of four different influenza viruses (human, North American avian, North American swine, and Eurasian swine strains). Genetic analysis and computer modeling suggest this virus or a similar one spread unnoticed in the last quarter of 2008 and caused illness in about 23,000 people in Mexico through April 2009. Today, great concern exists that SOIV will further mutate and develop greater virulence.

How Different Is SOIV?

In general, human influenza viruses cause a lot of serious disease every year. During seasonal outbreaks in this country, CDC estimates that

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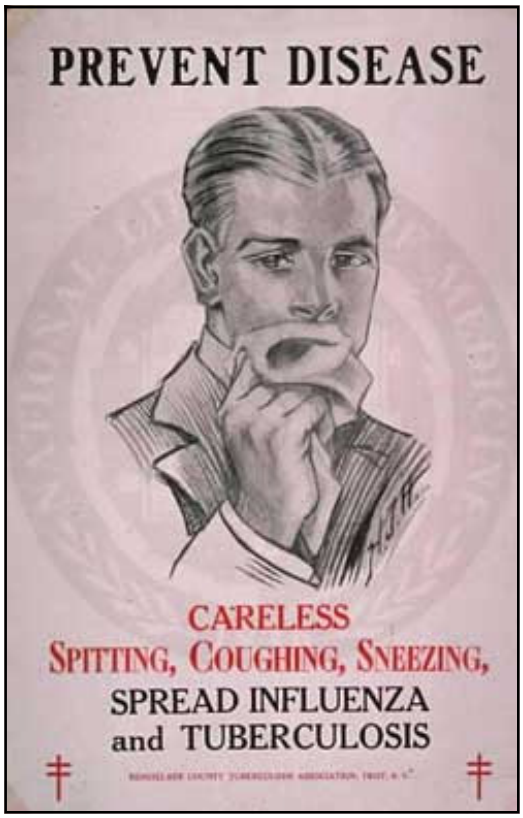
5-20% of the population becomes ill ("attack rate"). On average, 200,000 of these ill persons will be hospitalized and 36,000 will die (case fatality ratio = 0.1%).

Recent WHO analysis of data from Mexico suggests that this new virus has an attack rate that varies greatly by age (< 15-years-old: 61%, ≥ 15: 29%). In addition, WHO estimates that the case fatality ratio for this new virus is 0.4%. This is somewhat greater than that seen with seasonal influenza in the United States and comparable to the case fatality ratio associated with the influenza A H2N2 pandemic in 1957. Although the general impression has been that this virus is comparable to seasonal influenza viruses, these recent data suggest there is potential for greater morbidity and mortality.



Forerunner of "Cover Your Cough"
Poster courtesy of The American Lung Association

In the absence of a specific vaccine, non-pharmaceutical interventions may be used to lessen the impact of epidemic transmission of a novel virus. Public health response may be based on an index of the severity of the pandemic, as defined by the attack rate and case fatality ratio. Based on the findings from Mexico, a basis exists for increased concern and enhanced response. Currently all levels of public health in the United States are closely monitoring the severity of this outbreak to determine the need for more austere non-pharmaceutical interventions should severity rise.

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The Outbreak in Washington

Initial surveillance efforts determined the geographic range and spread of cases in Washington. In addition to healthcare provider reports of suspected cases from local health jurisdictions (LHJ) to the Washington Department of Health (DOH), all laboratories within Washington were asked to submit influenza A-positive samples to the Washington State Public Health Laboratories (PHL). Influenza Sentinel Providers (ILI-Net) were asked to test all outpatients with influenza-like illness. This resulted in a large number of submissions to the PHL. From 26 April through 22 May, PHL has tested 1,414 samples; of these, 575 (41%) have been positive for SOIV. These positives have been reported from 17 of Washington's 35 LHJs. Samples have been collected from a wide variety of patients including outpatients

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with influenza-like illness and hospitalized patients with pneumonia and respiratory failure. Among confirmed Washington cases, the earliest onset date is April 23rd and the median age is 13 years. Although all case reports have not yet been processed, at least 37 cases (6% of 575) have been hospitalized.

Checking serologies for presence of Swine Flu, 1976
Photo courtesy of CDC, Katherine Lord

Now that this virus is widely present and identified as the cause of hundreds of cases in Washington, we are changing our surveillance methods. The goals of surveillance will be to monitor the activity of this virus over the next several months before the beginning of the 2009-2010 influenza season and to watch for changes in illness severity that may suggest further mutation of SOIV. Starting in the last week of May, DOH will ask that LHJs report cases of hospitalized or deceased persons with a positive test specifically for SOIV. Although this likely represents only a small proportion of the cases that are occurring, we will be able to extrapolate the incidence of influenza due to SOIV. Readers are directed to http://www.doh.wa.gov/ehsphl/Epidemiology/CD/swineflu/sfluresources.htm for further description of the proposed changes in surveillance.

Outbreak Response

In the last five weeks, a major response challenge has been to maintain consistency and accuracy of public health messages during a rapidly changing outbreak of a novel pathogen. Public health communications first addressed what was known about the virus and where it had spread. Now, community interventions have become the primary focus of activity. CDC has provided a series of guidances (http://www.cdc.gov/h1n1flu/). Topics include case investigation, patient care and treatment (with special consideration for high-risk groups such as pregnant women), infection control, laboratory testing, and social distancing (e.g., closure of schools and universities). With extremely limited information about this virus, many recommendations were initially based on the assumption that the virus was highly virulent. But, as we have to come to better understand its virulence, state and local health departments have tailored the CDC guidances. For example, initially, schools closed for a single case. As severity was found to be more similar to seasonal influenza, Public Health – Seattle & King County was among the first jurisdictions to issue recommendations that schools not close unless necessitated by high absenteeism.

During the peak of the outbreak, DOH had daily telephone calls with local health officers to discuss community mitigation. The goal was to include perspectives from a number of jurisdictions to achieve consistency and consensus in policies on such topics as school closure, duration of voluntary isolation, role of quarantine and use of masks by health care workers and the general public.

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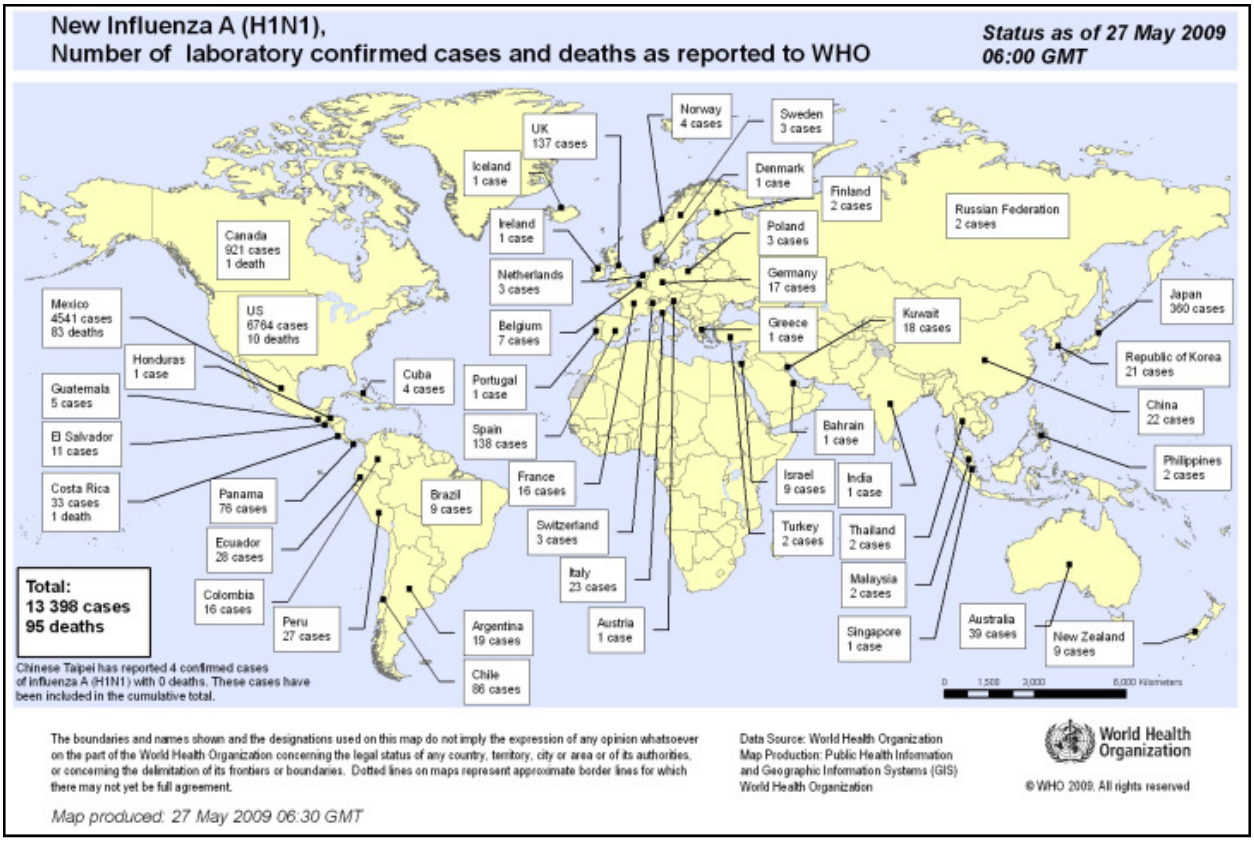
Future Challenges

Differences in the disease severity between Mexico and the United States affected many decisions about community mitigation efforts. Retaining the ability to rapidly assess changes in severity will be critical, so ongoing surveillance in Washington will concentrate on detection of severe or fatal cases to determine the incidence of illness as well as to define the most severe forms of illness and risk factors for severe illness.

Information is rapidly changing and any document, including this one, may be quickly outdated. For most recent updates on guidelines, please refer to the websites noted above.



Countries to which Swine Origin Influenza Virus (SOIV)/H1N1 has spread as of May 27, 2009
Map courtesy of the World Health Organization

References

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